

AN OUTBREAK OF HUMAN *LEISHMANIA (VIANNIA) BRAZILIENSIS* INFECTION

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The occurrence of acute cutaneous leishmaniasis among inhabitants of 10 farms within 10 Km of the hamlet of Corte de Pedra, Bahia, Brazil was studied prospectively from 1984-1989. A mean population of 1,056 inhabitants living in 146 houses were visited every 6 months and the number of skin ulcers recorded. A leishmanin skin test survey was done people with suggestive skin scars or active disease in 1984. The incidence of skin ulcers due to Leishmania (Viannia) braziliensis (Lvb) reached 83/1,000 inhabitants but declined sharply in the subsequent 2 years. Retrospective data shows that leishmaniasis is a sporadic endemic disease. Although the reasons for this epidemic are unclear some possible aetiological factors are discussed.

Key words: *Leishmania (Viannia) braziliensis* – epidemic in man – Bahia state

We have recently reported a 5 year prospective study of the incidence and prevalence of human cutaneous leishmaniasis due to *Leishmania (viannia) braziliensis* (Lvb) among the inhabitants of 15 farms in the cacao growing littoral region of Três Braços, BA, Brazil (Jones et al., 1987). These farms were within a 20 mile radius of the hamlet of Três Braços where we have maintained a field clinic for the diagnosis and treatment of mucocutaneous leishmaniasis for the last 15 years. Cutaneous leishmaniasis was endemic and sporadic in these farms with small numbers of cases occurring yearly in most study sites. The mean incidence of disease reached 8.1/1,000 with a prevalence in 1984 of 160/1,000. Mini epidemics occurred at 5-7 year intervals.

While this study was in progress however we received lorry loads of patients at our clinic in Três Braços from the nearby hamlet of Corte de Pedra 45 Km away. Since the need for medical care in that areas was great a second

medical post was established there in 1984 which has since seen and treated over 1,000 patients with acute cutaneous leishmaniasis. Ten nearby farms within 10 Km were subjected to the same type of study as we have reported for the Três Braços area. The results, showing that a much more significant epidemic occurred in Corte de Pedra than we have seen to date, form the subject of this communication.

MATERIALS AND METHODS

Corte de Pedra is a hamlet in the municipality of Valença, BA, Brazil lying at 13° 26'S and 59° 31'W close to the main road (BR 101) linking the cities of Rio de Janeiro and Salvador. In 1984 it was estimated that 846 people lived in the hamlet and 5,922 in surrounding farms. In the 10 farms selected for this longitudinal study the houses of approximately 1,000 inhabitants were visited regularly.

Corte de Pedra is an area where forest clearing to plant cacao and cloves has progressed to a greater extent than in Três Braços. Rolling hilly country with v shaped valleys, it lies 600-800 m above sea level. A heavy rainfall (1,300 mm) implies a high humidity (mean 78%). The temperature varies between 16-37 °C (mean 22 °C).

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The design of the investigation did not differ from that already described in the Três Braços survey (Jones et al., 1987). The houses in the 10 selected farms were visited every 6 months by a team of staff and students from the University of Brasília. The presence of a skin scar or an active lesion of leishmaniasis among family members was recorded on a standard form. In 1984 a decision was taken to request help from SUCAM to determine if residual insecticide spraying of houses would arrest the epidemic since there was evidence of peridomestic transmission. During 1984-1986 the houses in 5 of the 10 farms as indicated in Tables II and IV received 0.5 g of DDT/m² to the roof and walls at 6 month intervals.

Patients with active disease were referred to the clinic for investigation and treatment. Investigate procedures to identify and isolate the parasite have been previously described (Cuba et al., 1984). Taxonomic methods in use in our laboratory are monoclonal fluorescent antibody testing and isoenzyme identification of cultured promastigotes (Cuba et al., 1985). Routine diagnostic tests consisted of the leishmanin skin test, examination of Giemsa-stained impression smears for amastigotes from the inferior surface of the biopsy and histology. Serological tests employed the ELISA and indirect fluorescent antibody techniques.

RESULTS

To date from the clinic at Corte de Pedra 63 *Leishmania* isolates from patients with acute cutaneous disease have been examined in our laboratory (Rosa et al., 1988). All have been identified as Lvb. 735 residents in 10 farms accepted a leishmanin skin test to detect active or past infection. Patients (81.3%) with scars of past cutaneous leishmaniasis had a positive leishmanin skin (> 5 mm induration after 38 h).

The number of householders interviewed and the yearly incidence of acute skin leishmaniasis in the area is shown in Table I. Retrospective data was also collected and the combined results from 1980-1989 are recorded in Table II. These results show that a marked epidemic occurred in this area in 1984 peaking at an

incidence of 83/1,000 inhabitants. Since approximately 1,000 people were seen in the years of the prospective survey it can be assumed that for the retrospective survey the number of acute cases represents the approximate number per thousand inhabitants.

TABLE I

Incidence of cutaneous leishmaniasis in the study population around Corte de Pedra, Bahia, Brazil - 1984-1988

Year	Number of people interviewed	Number of new cases	Incidence/1,000 inhabitants
1984	940	83	88,3
1985	1093	15	13,7
1986	1124	3	2,7
1987	1052	6	5,7
1988	1038	26	25,0
Mean	1049	27	25,4

Table III shows that the disease has been present in the area for a long time. The 4 farms with the highest incidence of cases were recording human infections before 1960 and the disease remained a sporadic endemic infection until the recent outbreak in 1984. In Table IV the distribution of cases of acute cutaneous leishmaniasis is related to age. Children and young adults comprise the majority of the population and had the highest infection rates. Many acute cases of leishmaniasis occurred in very young children who do not go into the forest suggesting peridomestic transmission. Only 3 cases of mucosal leishmaniasis were detected in these 10 farms during this study.

Table V classified the farms into sprayed and unsprayed categories and examines the incidence of new cases of leishmaniasis seen in 1987 and 1988. The dates of DDT spraying applications were December 1984, June 1985, January and September 1986, May and November 1987. Spraying ceased in November 1987 and without the control group of unsprayed farms the insecticide effect dissipated in 1988. A curious finding is that there was significantly more cutaneous leishmaniasis in the sprayed farms ($p = 007$). However due to a fault in our locale selection there was noticeably less forest clearing in these farms.

TABLE II

Number of cases of cutaneous leishmaniasis in 10 farms around Costa de Pedra, Bahia, Brazil – 1980-1989

Farms	Mean annual population	Number of cases										Total	Forest
		1980	1981	1982	1983	1984	1985	1986	1987	1988	1989		
A. Bonito ^a	68	1	–	1	3	6	1	–	–	1	2	15	++
Julião I ^a	175	–	1	7	9	7	1	–	–	6	–	31	+
Julião II ^a	136	4	2	4	1	9	1	–	1	10	–	32	++
Julião III ^a	43	–	–	1	3	4	–	–	–	–	1	9	+
Recôncavo ^a	124	2	–	1	8	16	3	–	1	4	1	36	+++
A. Comprida	102	1	1	2	3	6	6	1	1	1	–	22	+++
R. Touceira	115	1	–	1	1	10	2	–	1	2	–	18	++
Tabuleiro	108	–	1	2	5	8	1	–	1	2	–	20	–
Pataxó I	74	2	2	2	11	12	–	1	1	–	2	33	+++
Pataxó II	103	1	2	4	2	5	–	1	–	–	–	15	–
Total	1,048	12	9	25	46	83	15	3	6	26	6	231	

a: houses in farms sprayed twice yearly with DDT from 1984 to 1987.

Key to Forest: (+) some; (++) moderate; (+++) intense forestation.

TABLE III

Occurrence of cutaneous leishmaniasis in the 4 farms with most disease around Corte de Pedra, Bahia, Brazil – 1961-1988

Farms	Number of cases							
	–/61	61-64	65-68	69-72	73-76	77-80	81-84	85-88
Pataxó I	4	0	1	3	1	3	27	2
Julião I	4	3	4	5	10	9	24	7
Julião II	8	0	1	1	3	4	16	12
Recôncavo	3	0	0	5	1	3	25	8

TABLE IV

Distribution of cutaneous leishmaniasis cases in relation to age in the 10 farms around Corte de Pedra, Bahia, Brazil – 1982-1986

Age in years	Population under study (%)	Population affected (%)
0 – 9	405 (38.4%)	65 (6.2%)
10 – 19	246 (23.3%)	61 (5.8%)
20 – 29	163 (15.4%)	22 (2.1%)
30 – 39	90 (8.5%)	13 (1.2%)
40 – 49	59 (5.6%)	3 (0.3%)
>50	93 (8.8%)	8 (0.8%)
Total	1056 (100%)	172 (16.3%)

DISCUSSION

As was discussed in our previous paper (Jones et al., 1987) we still have too little understanding of the epidemiology of Lvb transmission in the region to offer an explanation for this recent epidemic. Certainly human infections occurred with a much greater frequency in these 10 farms in Corte de Pedra than was recorded previously in Três Braços where the maximum incidence only reached 8/1,000 less than one tenth of the equivalent value for Corte de Pedra in 1984. Although there is evidence in the figure of a gradual build up of cases in 1982 and 1983 the fall off from the peak in 1984 is dramatic even in the farms where the houses were not sprayed with insecticide. Retrospective data from both Três

TABLE V

Comparison of new cases of cutaneous leishmaniasis unsprayed and sprayed farms around Corte de Pedra, Bahia, Brazil - 1987 - 1988

Details of spraying	Name of farm	Population	1987 No. new cases	1988 Interviewed	1988 No. new cases
Sprayed farms	Julião I	184	—	181	6
	Julião II	139	1	137	10
	Julião III	39	—	30	—
	Recôncavo	122	1	132	4
	A. Bonito	70	—	67	1
Total		554	2	547	21
Unsprayed farms	Pataxó I	71	1	74	—
	Pataxó II	99	—	102	—
	A. Comprida	101	1	97	1
	R. Touceiras	114	1	107	2
	Tabuleiro	113	1	111	2
Total		498	4	491	5 ^a
Grand total		1,052	6	1,038	26

a: significantly more leishmaniasis in the sprayed farms $p = 0.07$

Braços and Corte de Pedra suggests that unpredictable outbreaks of disease are occurring in such farms. This is our experience at the field clinics. Suddenly many patients with acute disease will appear from one locality in the region. Normally it is in these localities that the majority of phlebotomine captures and animal trapping is done in the hope of identifying vector flies and animal reservoirs.

In Corte de Pedra, although there is some secondary forest left in small stands, we could detect no evidence of recent forest clearing associated with this outbreak. The epidemic occurring in 1984 affected small children who do not go into the forest. Since the houses are usually in the cacao plantation it is of interest that 99% of phlebotomines captured in the peridomicile and 97.5% of flies captured in the house are of a single species *Lutzomyia whitmani* (Vexenat et al., 1986a). This is in contrast to the forest where only 1% of phlebotomines are of this species suggesting a favourable adaptation by this species to cacao cultivation where probably breeding is occurring. Recently at least 3 isolates of Lvb from *Lu. whitmani* have been characterised in our laboratory (Hoch et al., 1986; L. Hoch, personal communication). These flies were caught in the cacao plantation suggesting transmission is

occurring there (L. Foch, personal communication). There seems to be little likelihood of forest clearing controlling leishmaniasis transmission as has occurred in the forest of French Guyana with *Leishmania guyanensis* (Esterre et al., 1986). However in relation to the great number of flies dissected (40,000+) the infection rate is remarkably low. Unfortunately we have no information on the population density of this species in the 10 farms during the study period. Another factor which should be investigated is the habit of spraying the cacao trees with residual insecticide every 6 months. We have anecdotal evidence (Fazenda Vovó) that it is in farms where such spraying has not occurred due to cost that outbreaks occur. Although we tried to seize the opportunity of this epidemic to see if domiciliary spraying with DDT would influence the number of human infections these fell so markedly in 1985 that we can draw no firm conclusions as to the result of this intervention. SUCAM does not recommend residual insecticide spraying of houses as a way of controlling cutaneous leishmaniasis.

Another possibility to explain this sudden epidemic in Corte de Pedra is the introduction by an animal reservoir of an infective source into the area disturbing the normal ecological

balance. Only one sylvatic animal reservoir of Lvb has been found in the region although 866 rodents, 241 marsupials and 27 animals of other groups have been examined for *Leishmania* (Peterson et al., 1988). There is a necessity to examine more specimens of the larger rarer animals. For example a *Leishmania* that grows rapidly in hamster tissues has been isolated from an *Agouti paca* but since it resists all attempts at cultivation it cannot be characterized.

As in Venezuela and other parts of Brazil both dogs (Barreto et al., 1984) and donkeys (Vexenat et al., 1986b) have been found infected with Lvb. Current infection rates for these domestic animals is 23% for dogs and 10% for donkeys (A. Vexenat, personal communication). What is not clear however is whether these are merely incidental hosts infected as is man or whether they play an important role as reservoirs and are capable of initiating epidemics.

Falqueto et al. (1986) found in a small prospective study that houses containing a infected dog registered more human cases than those where the dogs were clean. A recent cross-sectional study in our area suggests that infected dogs and humans tend to co-exist but this is not proof of the role of the dog as reservoir. Aguilar (1984, 1987) studying canine and equine reservoirs suggests that an infected donkey entering an area could infect transmitting flies and initiate an epidemic but prospective observations over time is also lacking in these studies from Rio de Janeiro. The role of the domestic animals must be further examined and the search continued for the supposed wild animal reservoir.

Clearly more data is needed from this area of the Bahian littoral on both the vector phlebotomines and the animal reservoirs before the role of these factors in the generation of epidemics can be assessed. Even if a reliable vaccine were available it would be difficult to identify a group to vaccinate when the epidemics appear to be of such short duration and occur in such a haphazard fashion. In the short term the best answer to this community problem is to establish health posts where staff skilled in the use of glucantime can treat individual patients seeking help. Such a service has been in operation in our field area since 1975.

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